

Designing Organizations for Dynamic Capabilities

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Manuscript for
California Management Review

Special Issue on
Dynamic Capabilities

Editors
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Abstract

How can organizations put dynamic capabilities into practice? We focus on the power of organizational design, showing how managers can harness new organizational forms to build a capacity for sensing, shaping and seizing opportunities. Fast-moving environments favor open organization and self-organizing processes that quickly convert individual capabilities into actionable collective intellect. We argue that self-organizing processes do not organize themselves but require managers to design and execute them. We examine new design principles – such as polyarchy, social proofs, and new forms of open organization – that allow organizations to build dynamic capabilities for sustained innovation in dynamic environments.

Key words: organizational design, dynamic capabilities, sensing, seizing, crowds

Introduction

Valve Corporation was founded in 1996 by Gabe Newell and Mike Harrington, former Microsoft employees. Valve began as a video game company, producing best sellers such as Half Life and Portal. Later the company evolved into a digital distribution platform, known for products such as Steam and SourceForge. Their self-reported revenues per employee and profit per employee exceed those of Facebook and Google.

Valve has succeeded in a fast moving environment that requires constant agility, strategic innovation and market adaptation – precisely the kind of environment that places dynamic capabilities at a premium. And how did they develop and harness these capabilities?

According to interviews we conducted at Valve, the secret to their success is organizational design, the principles of which are embedded in the company's *Handbook for New Employees*.¹ Here are some quotes from the *Handbook*:

“The company is yours to steer – toward opportunities and away from risks. You have the power to green-light projects. You have the power to ship products.”

“You were not hired to fill a specific job description. You were hired to constantly be looking around for the most valuable work you could be doing.”

“We’ve heard that other companies have people allocate a percentage of their time to self-directed projects. At Valve, that percentage is 100.”

We learned in our interviews that the company constantly reinforces these principles by providing resources and support to put them into practice. For example, employees are allowed to choose their own projects, recruit people to those projects, and initiate new products or platforms without higher approval.

Valve, which we will examine in more detail, illustrates the core theme of our paper: that organizational design is the crucial enabler of dynamic capabilities. Valve’s founders knew from experience at Microsoft, some of it hard-earned, that the company could not succeed without staying at the forefront of market innovation. They also knew that successful innovation

depended on their capacity to harness individual and team initiative, and that traditional forms of organizational design – functional silos, top-down hierarchical structures, routinized formal processes – could stifle creativity, initiative and market responsiveness. Hence, they turned to alternative forms of organizational architecture – a unique blend of polyarchy, social proofs, self-organizing teams and open organization – to release the creative power of teams and individuals. By attending to organizational design and day to day execution, Valve built a capacity for sensing, shaping and seizing market opportunities.

Dynamic Capabilities

Many industries are subject to rapid technological change, market entry from global innovators, and volatility in market demand. Companies that cannot anticipate or respond to external disruption are unlikely to survive. In volatile industries, organizations need strategies, structures and processes that enable agility and responsiveness in a shifting competitive landscape.

The theory of dynamic capabilities came about as an attempt to explain competitive advantage in volatile industries. As the 20th century came to a close, internet-based technologies altered the competitive landscape across a broad range of market sectors, raising new challenges to conventional views of competitive advantage. The success of companies like Apple, Amazon, Google, and Facebook showed that a capacity to sense, shape and seize opportunities could revolutionize industries and transform national and global economies.²

In volatile markets, the functional and operational routines that drive competitive success in stable conditions – “baseline” capabilities such as supply chain management and access to distribution channels – become subject to rapid obsolescence. Even if a company’s advantages are inimitable due to experience or proprietary knowledge, disruptive technologies and business models can undermine the underlying drivers of industry advantage, making conventional advantages irrelevant or out of step with market conditions and customer requirements.

The dynamic capabilities view of competitive advantage argues that success in volatile industries requires higher-order capabilities that enable companies to anticipate, shape, and adapt to shifting competitive landscapes. The dynamic capabilities view accepts the importance of capabilities like product design and manufacturing, but argues that success in volatile industries requires something more than baseline capabilities: namely, adaptive processes and structures that enable companies to *change* their baseline capabilities, anticipate shifts in market demand, develop and integrate new technologies, learn from market events, and foresee and capture new market opportunities.

The competitive landscape of the 21st century may or may not be more turbulent than the world of the past – the point is debatable.³ But it is certain that the old tools of organizational design – hierarchy, chains of command, functional areas, formal reporting, long-term planning – are not well-suited to success in volatile markets. Competitive advantage in these markets requires a higher-order capacity to sense, shape and seize new market opportunities.⁴ This means that continuous improvement of existing capabilities is not enough, but that organizations need an overarching capacity for developing new capabilities that anticipate and respond to a turbulent marketplace. Perhaps it is not surprising that a few pioneering companies have experimented with new organizational architectures, discovering new structures and processes suited to continuous innovation.

Individual and Collective Capabilities

Volatile environments place stringent demands on information processing in organizations. For an organization to sense, shape and seize opportunities, it must somehow obtain and process current and reliable information. As organizational sociologist Arthur Stinchcombe wrote, “If organizations have to deal with uncertainties, then someplace in the organization there have to be people who bring information to bear on those uncertainties.”⁵

But who are those people? Who in an organization possesses enough information, knowledge and capability to cope with the uncertainties that arise in turbulent competitive environments? Who fully grasps the latest changes in customer preferences, social media chatter, threats to the company's supply chains, or innovations of actual and potential competitors? Who understands the economic and social consequences of national political debates, global military conflicts, demographic shifts, government policies, digital technologies, global health crises, and climate change?

The short answer is: no one. Many chief executives keep a finger on the pulse of political debates and general competitive dynamics, and this may be possible even in volatile environments. But CEOs are poorly placed to keep a close eye on fast-moving developments in social media, product and process technologies, and customer preferences, and to make unbiased inferences about their consequences. Other people in (and beyond) the organization – scientists in the lab, salespeople in the field, overseas manufacturing managers, customer service representatives in branch offices, contract consultants, customers themselves – have better information and knowledge, more specialized training, and a finer-grained appreciation of movements on the ground in their domains.

Therefore, the first challenge in designing organizations for dynamic capabilities is to capture what is already there – information, knowledge, experience, capabilities – and to bring it all to bear on collective decision making. As Kenneth Arrow pointed out, an organization can “acquire more information than any individual.”⁶ In organizational decision making, each individual has some unique information but no individual has enough information to make collective decisions. The task of the organizational designer, both in concept and practice, is to design structures that put individuals in contact with their relevant environments, and to design processes that facilitate learning, sharing and aggregation of individual knowledge so that the collective organization can make well-informed decisions.

This task presents special problems in volatile industries, with consequences for the design of strategies, structures and processes. The most common error companies make is trying to have it both ways, giving lip service to innovation and decision autonomy, while retaining bureaucratic processes and reward systems that perpetuate old ways of thinking. Sadly, most organizations talk a better game of design innovation than they actually play, and few are willing to sacrifice the centralized controls that perpetuate cognitive and social inertia. This leads to misalignments that deflate internal culture and stifle innovation – the well-known folly of rewarding A while hoping for B.⁷

At the other extreme, a company can go too far in flattening the organization and giving full decision autonomy to unaccountable individuals at the organization's boundaries. A company that adopts this approach indiscriminately, without proper systems for converting individual knowledge into collective intellect, is liable to spin completely out of control.

Designing organizations for dynamic capabilities presents new challenges for managers and entrepreneurs. Because these challenges arise from empirical events in real-world environments, they are hands-on challenges, not theoretical ones. Indeed, the theoretical problem was well-stated long ago by 20th century organization theorists: How can we map the organization onto the full diversity of its environment (“differentiation”), while employing structures, processes and systems (“integrating mechanisms”) that prevent the organization from disintegrating into chaos?⁸ As these theorists pointed out, there are many possible solutions to this problem: mechanistic or “machine” organizations for stable environments, organic forms or “adhocracies” for unstable environments, and mixed forms suitable for other conditions.

These theories remain relevant and insightful. However, they do not give managers the practical tool they need to design organizations for dynamic capabilities.⁹ This is because many of the manufacturing and service industries that formed the empirical base for these theories declined after the 1970s; and what came after – the global, volatile, technology-driven information economy – gave rise to new kinds of design problems. The forms of market

volatility emerging in recent years require organizations to differentiate their structures globally rather than domestically, digitally as well as mechanically, virtually as well as physically, continuously rather than occasionally. This requires organizations to think more cohesively about the links between strategy and structure, designing flexible mechanisms for structural differentiation and integration that enable the development of dynamic capabilities. It is no longer a matter of “structure follows strategy” or “strategy follows structure” but of continuously orchestrating strategies and structures that enable the sensing, shaping and seizing of market opportunities. In the next section we discuss the organizational mechanisms that have begun to emerge, and illustrate them using Valve Corporation and other examples.

Design Tools for Dynamic Capabilities

Figure 1 illustrates the basic problem described in the last section. New environments require companies to find new solutions to the problem of market volatility. Companies must establish information-absorbing teams and individual specialists at or beyond the boundaries of the organization, and give these people real autonomy to solve problems and capture opportunities. A company that fails to differentiate its internal structure will fall into traps of insularity or folly (see Figure 1), finding it impossible to respond to fast-changing environments.

– INSERT FIGURE 1 ABOUT HERE –

At the same time, companies must bring together the knowledge and capabilities that sit with individuals and teams to achieve the shared purposes of the collective enterprise. Companies that differentiate but do not integrate – perhaps in the belief that autonomy is self-organizing – face the perils of organizational chaos. These kinds of organizations can produce great ideas, but lack the means to implement or commercialize them in the marketplace.

This brings us back to the central questions of the paper: What are the mechanisms of structural differentiation and integration that enable organizations to create dynamic capabilities

in volatile environments? How can companies increase collective intellect and achieve shared goals without stifling the creative autonomy of empowered teams and individuals?

To address these questions, we return to Valve Corporation and describe the two primary mechanisms they employed – polyarchy and social proofs – to achieve a balance of differentiation and integration in a dynamic environment.

Differentiation by Polyarchy. In political science, the term “polyarchy” refers to a system of government in which power is widely distributed to many individuals. The opposite of polyarchy is autocracy, with power residing in a single person; and there are many intermediate forms, including representative democracy.¹⁰ In economics and organization theory, scholars have discussed polyarchy in the context of flat or decentralized forms of organization in which autonomous individuals are empowered to make significant choices about the nature and scope of their own work.¹¹

Like every form of governance, polyarchy has advantages and disadvantages, and is better suited to some conditions than others.¹² As a guiding principle for the internal organization of companies, it has the advantage of giving authority to those who operate closest to the action.¹³ It gives autonomy to specialized individuals and sub-units at the boundaries of an enterprise, thereby facilitating local creativity, experimentation, and innovation, while minimizing bureaucratic impediments to project approval and implementation. As such, polyarchy prepares the ground for dynamic capabilities by enabling people to sense, shape and seize new opportunities.

In traditional terms, polyarchy can be seen as a form of radical decentralization – not a mere flattening of organization structure, but bestowing full autonomy of judgment, decision and execution to decentralized individuals and subunits. In recent years, many technology and internet-based companies have adopted elements of polyarchy, for example in software development (companies like Menlo Innovations and Basecamp), and online retail (the shoe retailer Zappos). Even larger and more established companies have conducted partial

experiments with polyarchy, especially in R&D-intensive industries – for example, Google and 3M give employees a percentage of free time to develop their own projects. Limited polyarchy can also be found in traditional industries like foods and consumer products (for example, at Morning Star, which produces tomato paste),¹⁴ and in knowledge-intensive industries like professional services and academia.¹⁵

At Valve Corporation, polyarchy is the driving principle of structural differentiation. As part of its core values, the company deliberately seeks to build dynamic capabilities for sensing, shaping and seizing new market opportunities. The aim of structural differentiation at Valve is to go beyond traditional decentralization and empowerment by giving full release to the market potential of talented specialists in product research, design and engineering. To this end, the company gives individuals full autonomy to propose projects, recruit project teams, establish budgets, set timelines, and ship products to customers.

A good example of this is the Valve product platform called Steam, designed for digital distribution, digital rights management, broadcasting and social networking. The Steam project did not come from top-down processes like competitive analysis, formal market research, and the capital investment and budgeting cycle. Rather, a few creative individuals at the organization's boundaries saw that their latest ideas about video software mapped onto a potential market opportunity. They floated these ideas with potential users, pitched them to other Valve employees, recruited talent onto a project team for design and execution, and ultimately produced one of the industry's most innovative and successful platforms (75% of all games downloaded onto PCs are now sold through Steam).¹⁶ Compared with top-down R&D processes, Valve's polyarchical approach delivered improved consumer engagement, project team motivation, and speed to market.

Polyarchy starts at the point of employee selection. Recruitment processes at Valve do not focus on hiring into particular jobs with fixed job descriptions, but on finding people with the capacity to create value in a marketplace of ideas. The question is not whether the candidate can

learn the rules, write reports, and work within the requirements of a functional role, but how well they can thrive when given the resources and freedom to identify and create a new market opportunity. At Valve, the criteria for selection relate directly to the formation of dynamic capabilities – that is, the company selects for the ability to sense, shape and seize new market opportunities.

The *Handbook* plays a crucial role in guiding people in the search for new projects, and in deciding which project teams to join. Rather than telling people what to do, the *Handbook* poses questions:

1. Of all the projects currently under way, what's the most valuable thing I can be working on?
2. Which project will have the highest direct impact on our customers? How much will the work I ship benefit them?
3. Is Valve not doing something that it should be doing?
4. What's interesting? What's rewarding? What leverages my individual strengths the most?

The responsibility for sensing, shaping and seizing opportunities does not rest with the top management team, or with a marketing group or R&D department, but with all employees. As might be expected, individual rewards and incentives at Valve Corporation are closely tied to idea generation, project success and market outcomes. A crucial element of remuneration and performance review is a system of peer evaluation, in which people and project teams are ranked by their peers based on measures of innovation, contribution and value creation. Hence, the company is giving more than lip service to the concept of empowerment. According to Valve's founders, skilled programmers and systems engineers are often undervalued in the labor market, in part because so many companies in North America and Europe have offshored core engineering activities, leaving capable engineers underemployed. The founders sought talented engineers who could thrive when empowered to create and implement new ideas, backed by a compensation and incentive system that rewards individual initiative and market innovation.

Valve employs a number of mechanisms to encourage and guide the creative forces unleashed by radical decentralization. However, these are not the traditional mechanisms of formal controls, operating procedures, plans, reporting, or even organization culture. Instead, Valve achieves structural integration through a set of mechanisms that can be classified broadly as “social proofs.” As shown in the next section, the most important of these are self-selection and social convergence.

Integration by Social Proofs. In social psychology, a social proof is any mechanism of social influence that tends to produce coordinated behavior among individuals. The nature of social proofs is to induce a kind of social contagion in which beliefs, preferences, and practices disseminate through a population of individuals.¹⁷ There is no suggestion that social proofs always produce positive outcomes, and indeed many mechanisms of social influence are known to produce dysfunctional outcomes such as groupthink, group polarization, conformity, herd behavior, and the madness of crowds.¹⁸

Nonetheless, companies like Valve have found that social proofs form an effective counterbalance to the extreme differentiation of polyarchy. The strength of polyarchy is its capacity to devolve decision authority to the individuals with the greatest information, experience, expertise, and incentives to achieve. What it lacks is coordination with colleagues or accountability to the company as a whole, and this is what social proofs are designed to provide. A purposeful system of social proofs, applied in a polyarchy of talented and well-resourced individuals, can provide an effective counterweight to the chaotic tendencies of extreme differentiation.

The primary mechanism of social proofs is self-selection. At Valve Corporation, people choose their own projects and vote with their feet. They assess markets for new opportunities, gather information about existing projects and teams, and make their own judgments about whether to affiliate with existing teams or form their own projects. This does not mean that everyone makes optimal choices, or that social biases or politics are absent; indeed, people

actively try to persuade others to join their project teams. However, experience at Valve suggests that the aggregate choices of individually-empowered experts contain a powerful signal about the future direction of the marketplace – a form of collective wisdom that serves as a barometer and guide to the strategic direction of the enterprise.¹⁹ Even if the signal contains social noise, Valve managers believe that self-selection yields more reliable and lower cost information, and faster market responsiveness, than traditional controls and incentives.

Self-selection empowers the right people to make decisions, but cannot alone overcome the problems that arise in polyarchies in their purest form – for example, cost inefficiencies and duplication of effort.²⁰ Valve executives did not want to impair individual initiative by requiring layers of project approval, but they had learned from experience that one or two individuals, no matter how talented, could not command enough information or resources to sense, shape and seize a large-scale market opportunity.

To solve this problem, Valve’s founders devised a method of social convergence they called the “rule of three,” a novel solution that harnessed individuals’ capacities to sense and seize opportunities while providing behavioral incentives to coordinate activity and minimize inefficiency. According to this rule, one or two people acting alone could not move a project forward, but a group of three could receive a green light. This allowed project teams to tap into company resources and the “wisdom of crowds” for designing and delivering significant products, while giving decision makers a clear and implementable “tipping point” for project investment decisions.²¹ As a principle of social convergence, the “rule of three” offers a relatively light-touch intervention that allows the company both to stimulate innovation and to bring the chaos of polyarchy under control, a solution reminiscent of David Teece’s comment on innovation in Silicon Valley: “let chaos reign, *then rein in chaos.*”²²

New market innovations seldom present themselves as obvious opportunities for capital investment, and do not come with fully-formed business models for implementation. Design tools such as self-selection and the “rule of three” incentivize people not only to sense new

opportunities, but to shape those opportunities through social processes of bargaining, influence and recruitment. New strategies and business models emerge and evolve as individuals compete for resources and challenge each other over the definition, scale, scope and implementation of proposed innovations. This is not the case when social proofs are absent, especially in pure polyarchies where individuals are fully empowered to act on perceived market opportunities. Social proofs like self-selection and the “rule of three” serve as valuable filtering and enabling devices that redefine and transform new ideas, shaping market opportunities in the crucial period before the company makes significant strategic commitments.

Valve is not the only company to use polyarchy and social proofs to capture the “wisdom of crowds.” For example, the Danish hearing aid manufacturer Oticon experimented with a similar combination of polyarchy and social proofs, using internal markets or “market-hierarchy hybrids” to produce the spontaneous order of self-organized project teams. As Nicolai Foss pointed out from a transaction cost perspective, the organizational designs of companies like Oticon replace the visible hand of management with the invisible hand of social proofs, substituting social markets for structural hierarchies.²³

The combination of polyarchy and social proofs can also be found in creative industries and project-based environments. In Hollywood, for example, movie ideas and production processes are generally driven by flat, emergent structures.²⁴ Unlike the studio culture of the 1930s – in which powerful studio heads exercised firm control over people, contracts and projects – modern film-making is a breeding ground for polyarchy and social proofs, with diverse groups of talented people empowered to develop new ideas, raise capital and greenlight projects.²⁵

Some of these innovations in organizational design have been adapted to the contexts of larger organizations and more stable industries. Google’s uses of flat organization and various aspects of polyarchy and social proofs are well established.²⁶ Michael Tushman and colleagues have documented how IBM found ways to empower individuals to sense potential market opportunities, linking individual and team initiative with corporate culture and reward systems.

Though IBM did not achieve this through Valve-like social proofs (such as the “rule of three”), managers linked the activities of specific functional areas to the sensing of new opportunities and to the execution of strategies for capturing these opportunities. According to Tushman and colleagues, this approach transformed IBM’s culture and practices, allowing the company to “sense changes in the marketplace and to seize the opportunities by reconfiguring existing assets and competencies.”²⁷

For creating dynamic capabilities, the new market-hierarchy hybrids have a number of advantages.²⁸ A key advantage is that the ebb and flow of collective preferences allows everyone in the enterprise, not only top managers, to monitor and influence the strategic direction of the company; or, as Valve tells its employees, “the company is yours to steer.” Because social convergence drives major investment decisions, individuals track the internal grapevine closely and develop keen sensitivities to social thresholds. This has the effect of intensifying communication and increasing overall strategic transparency. As evolved social actors, people seem to know intuitively when an idea has reached the required threshold of social support, or “tipping point.” When this happens in a polyarchy, the pace of events accelerates and a critical mass of resources rapidly converges on the idea. Interestingly, this heightened sensitivity to social thresholds is also a common feature of animal behavior, where “quorum sensing” has been shown to produce better collective outcomes than other decision processes (see Sidebar: Quorum Sensing).²⁹

The combination of polyarchy and social proof also has the useful property of decoupling the sensing of market opportunities from the seizing of them. Research on creativity suggests that discovery and idea-generation are better performed by individuals than by groups, which use interactive processes such as brainstorming that are subject to a host of behavioral and social biases (such as anchoring, status relationships, formal authority and groupthink). However, the evaluation and choice of ideas – the seizing of opportunities – is better

accomplished when people consider diverse perspectives, which is facilitated by social interaction and the mechanism of self-selection.³⁰

Social proofs allow firms to maximize individual and social cognition. At Valve Corporation, the sensing of opportunities rests largely with expert individuals at the interface of the organization and its potential markets; as we have seen, this is facilitated by polyarchy. The seizing of opportunities, however, depends on the ability of one or more individuals to recruit people and resources by establishing the external legitimacy of their ideas. This is the role of social proofs, and involves sub-processes such as pitching, recruiting, bargaining, and consensus building. These sub-processes buffer the organization from poor investment decisions by providing a rigorous competitive test of social legitimacy before resources are fully committed.

Social proofs also serve as partial countermeasures against individual cognitive biases.³¹ Research in behavioral strategy shows that individuals exhibit a large number of cognitive decision biases, such as overconfidence, wishful thinking, confirmation bias, and loss aversion.³² Most cognitive biases are hardwired, unconscious and unintended, and resist remedies at the individual level regardless of knowledge or awareness.³³ However, as urged by Thaler and Sunstein and others, individual biases can be mitigated by organizational designs and social architectures that constrain individual biases, or make them less harmful in their effects.³⁴ For example, organizations can design decision processes that require managers to consider a range of strategic options rather than anchoring on a favored solution; or require participation according to expertise and experience rather than by rank and authority.

Organizational designs based on polyarchy and social proofs embed a number of potential countermeasures to individual cognitive biases. For example, polyarchy encourages companies to consider not only the favored options of influential top managers but a range of options derived from diverse sources, and social proofs encourage companies to consider ideas on their merits in a competitive marketplace of ideas, not according to the biases of select individuals constrained by loss aversion, confirmation bias and inertia. The sub-processes that drive social

proofs – pitching, recruiting, bargaining, consensus building – concentrate activity on project advocacy by subject experts, rather than on the preferences of authority figures. The sensitivity to social thresholds, or “quorum sensing,” directs attention to external market signals and away from the predispositions of individuals. The involvement of external stakeholders encourages an “outside view” of the organization as a counterbalance to internal decision myopia.³⁵ Although few remedies can overturn hardwired executive biases or social biases deeply embedded in decision processes, the new market-leaning structures promote a psychological architecture that helps companies “nudge” individual and social cognition into more productive channels.

Open Sensing, Shaping and Seizing

In stable environments, executives rely on experience, routines, learning, and scale effects to build baseline capabilities in functional areas like marketing and manufacturing. In volatile markets, however, organizational structures that protect and exploit current strengths can foster strategic inertia, or lure the company into “competency traps” in which they build increasing capabilities in things that no longer matter.³⁶ To develop the core processes that support dynamic capabilities – sensing, shaping and seizing – executives cannot manage solely by routines, systems, incentives and impersonal structural mechanisms. Instead, they must learn to rely on the characteristics and judgments of people, as they work individually, in groups, and toward the aims of the collective enterprise.³⁷

Organizational architectures based on polyarchy and social proofs enable individuals and groups to build higher-order capabilities for sensing, shaping and seizing opportunities. Self-selected team members engage more directly with organizational projects, and social proofs incentivize communication and coordination. The new designs give individuals the resources and incentives they need to build individual and joint capabilities, not only in technical areas like programming, computation, and systems engineering, but in softer skills such as communicating, managing conflict, and making sound judgments under uncertainty.³⁸ Sustained

attention to market opportunities maximizes individual and collective market knowledge, while enhancing the capacity both to interpret that knowledge and put it into action.

In the most effective polyarchies, the processes of sensing, shaping and seizing do not stop at the boundaries of the organization. Instead of fine-tuning internal functional area capabilities, companies like Valve excel in discovering opportunities that require the company to expand its repertoire of capabilities by opening up to forces beyond its own formal boundaries. To achieve this, the organization maintains porous boundaries that facilitate the free flow of information to and from the marketplace.

This means engaging with external stakeholders through open forms of innovation that invite customers and other actual and potential stakeholders into the company's learning and innovation processes.³⁹ Crowdsourcing, for example, allows companies to engage external stakeholders in collaborative innovation.⁴⁰ In its simplest form, crowdsourcing involves soliciting ideas directly from customers, for example by establishing online user communities in which customers critique existing products or contribute new product ideas.⁴¹ User communities engage external stakeholders as partners in sensing and shaping new market opportunities. By giving companies faster access to market data and new product ideas, crowdsourcing allows companies to find new market niches and serve customers better, while reducing search costs and time to market.⁴²

Innovation contests provide another way of engaging external crowds.⁴³ In dynamic environments, companies often do not know whether their problems are solvable or what kinds of expertise are required. Jeppesen and Lakhani argued that innovation contests represent a form of "broadcast search" in which companies pose problems for external constituents to solve.⁴⁴ By broadcasting the problem to targeted external crowds, the company gains access to a large and well-informed population from which individuals, motivated by the prospect of a monetary prize, can self-select to provide potential solutions.

Some companies take crowdsourcing much further, inviting customers not only to sense and shape opportunities, but to seize them. For example, Valve's Steam platform currently features more than 400 million pieces of user-generated content, and serves as an iTunes-type platform on which geographically-distributed users or developers can sell or freely distribute complementary products to consumers. For its role in managing this activity, Valve collects licensing and transaction fees. Valve also allows players to receive micropayments for adding new game levels or creating new in-game products. In this way, Valve facilitates the co-creation of market innovations, while extending its own dynamic capabilities in sensing, shaping and seizing opportunities.

Valve also brings stakeholders into the development process by acting as curator for the preferences of its user communities. On the Steam platform, the company facilitates discussions among the user community that determine which games are developed and listed. Developers can post trial versions of new software products, and users can vote and approve the ones they like (called Valve Greenlight). Valve also offers a tool called Steam Workshop that facilitates match-making and collaboration between game developers and consumers. Through such mechanisms, Valve continuously senses and seizes new market opportunities, collaborating with stakeholders to build dynamic capabilities.

In some markets, crowdsourcing provides not only the ideas, but the resources for implementing innovations. Many entrepreneurs have employed crowdfunding to launch successful ventures, often using intermediaries like Kickstarter, which connects entrepreneurs with potential investors. Crowdfunding gives under-resourced entrepreneurs both a seizing mechanism for capturing market opportunities, and a form of external social proof for legitimizing their market innovations.⁴⁵

The rapid dissemination of crowdsourcing – from technology companies like Valve to diversified consumer goods companies like PepsiCo, which used crowdsourcing to choose its Super Bowl ads – suggests that the range of organizations that can benefit from open

organization is broader than most people realized. At the same time, this dissemination suggests that organizations cannot count on open organization alone, any more than on traditional structures, to deliver sustained competitive advantage. Organizational innovators are constantly developing new architectures and dynamic capabilities, and combining them with new strategies and technologies. In a connected world, every company faces potentially disruptive innovations in its competitive markets, supply chains or distribution channels. This means that a company like PepsiCo can learn something about organizational architecture from a company like Valve.

The market conditions of 21st century competition demand less directive and more open forms of organization. These are not the same organizational designs proposed in theories of “organic” or “adhocratic” organization, but designs suited to the current state of technology, global competition and social demography. Companies like Valve Corporation have led the way in developing these designs, and in exploring their consequences for market innovation. As companies continue to co-evolve their strategies with new customers and technologies, they will face ever-increasing pressures for innovation, not only in dynamic capabilities, but in the organizational designs for putting them into practice.

Conclusions

It would be wrong to suggest that a company like Valve Corporation has got everything figured out. Valve competes in volatile industries and risky product segments, and nearly all of these markets experience high mortality rates. We can learn from Valve, but not as a case study of invulnerability. The real learning takes place when executives use examples like Valve to gain a new perspective on their own companies, and to adopt strategies and organizational designs better suited to the realities of their own environments (see Sidebar: Putting Dynamic Capabilities into Practice).

For most entrepreneurs and managers, we believe the lessons of contemporary organizational design are threefold. First, although open organizational architectures may seem

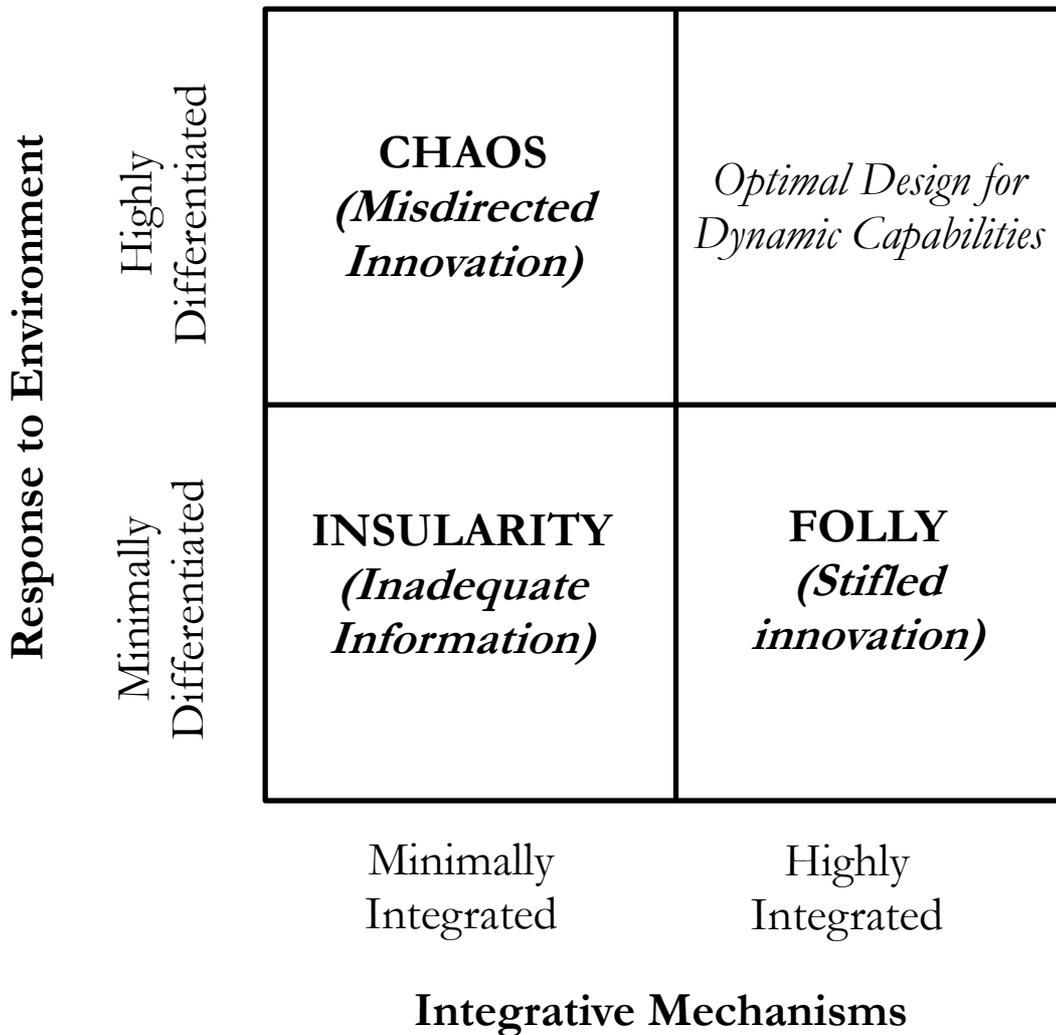
like a frightening prospect to many executives, they are not impossible to achieve. Executives may think that open organization is risky, like riding a bicycle down a mountain with no hands. But executives at companies like Valve would argue that the new architectures are less risky than trying to relegate sensing, shaping and seizing to a small number of high-level executives. This, they might say, is like using training wheels in an Olympic bicycle race. For most organizations, the solution lies somewhere in-between: companies that give new forms of empowerment to their people can experience the rewards of innovation, but they must balance empowerment with the guiding hand of social proofs and other forms of structural integration; in Teece's words, they must "let chaos reign" *and* "rein in chaos."

The second lesson, related to the first, is that self-organizing processes are not self-organizing. Just as there is nothing as rehearsed as skillful improvisation, there is nothing as designed as an effective self-organizing process. Traditional theories of organization have correctly insisted that a company must map its structural differentiation onto the diversity of its external environments, and must adopt mechanisms to integrate the company into a cohesive whole. Dynamic environments magnify these imperatives, requiring a continuous commitment to design, planning, and monitoring, and continuous adaptation of organizational structures and processes. Polyarchy without integration leads to chaos, and the new architectures fail when managers leave structural integration to unconscious forces and self-organizing processes.

Finally, we believe that the theory of dynamic capabilities gives support to the notion that companies must align market strategies with internal structures. The theory of dynamic capabilities is far from perfect, as many authors have pointed out.⁴⁶ However the theory reminds us – in a tradition that stretches back to Alfred Chandler, Peter Drucker, Igor Ansoff, and others – that competitive environments are always changing, and that one of the most essential functions of executive leadership is to align organizational capabilities with opportunities in the marketplace. In a world of turbulent markets, this means creating dynamic capabilities for

sensing, shaping, and seizing new opportunities, and creating new structures matched to the realities of the global competitive landscape.

Figure 1: Chaos and Folly in Organizational Design



Differentiation: The extent to which the organization maps onto the full diversity of its environment by establishing specialized individuals or sub-units at its boundaries, and giving them autonomy to solve problems and capture opportunities.

Integration: The extent to which the organization implements processes for converting distributed information into collective intellect.

Sidebar:
Quorum Sensing in Nature

Human beings are not alone in possessing highly-evolved intuitions for social consensus. Many animals in nature use what is called “quorum sensing” as a mechanism for harnessing collective wisdom and making crucial choices, such as where to nest or where to hunt.

For example, ants do not choose nesting locations by sending a single scout or small group on reconnaissance, but send roughly 30% of the population to sense the environment and recruit others to the most promising sites. The social threshold or tipping point for action – that is, when everyone knows to move to the new location – occurs when a critical mass or “quorum” of ants begins migrating to a preferred site. Mathematical models show that a collective decision process based on quorum sensing produces better decisions than other methods, showing the importance of social information processing in the animal kingdom.

For an excellent review of the literature on social animals, decision making and behavior, see David Sumpter’s (2010) *Collective Animal Behavior*, Princeton University Press.

Sidebar: **Putting Dynamic Capabilities into Practice**

Does your company think beyond baseline capabilities and conventional sources of competitive advantage? Does your organization structure facilitate continuous innovation and the capacity to sense, shape and seize new market opportunities? Concepts like polyarchy and social proofs lend themselves to launching a bold challenge to any company's approach to strategy and innovation. Below is a checklist for fundamentally rethinking a company's capabilities for sensing, shaping and seizing opportunities.

Sensing

- Where does knowledge about new technologies and market opportunities reside in the organization? How do we capture it?
- What kinds of opportunities lend themselves to dispersed sensing rather than top management opportunity search? Do we make this distinction?
- Who are our "sensors"? Who – inside or outside the organization – is best positioned to foresee new market opportunities?
- What incentives and rewards would motivate sensors to identify opportunities?
- How can we encourage people to share new ideas with others?
- How can the organization engage external customers (or potential customers) in sensing new opportunities? Can we "crowdsource" new ideas?

Shaping

- Do we have enough knowledge and expertise to shape the direction of technologies or product innovations? If so, who has it? If not, can we get it?
- How can we encourage our people to think boldly and creatively about the future direction of the marketplace?
- Does our culture induce people to produce the kinds of new ideas that shape markets? If not, why not? If so, how do we capture these ideas?
- Do we have mechanisms for testing new ideas – eg, pilot tests, experiments?
- Do we have processes to facilitate learning from the market?
- How can we encourage people to capture the "wisdom of the crowd"? How can we use external crowds to shape new market opportunities?

Seizing

- How many truly novel opportunities have we seized in the past 18 months?
- Who decides which opportunities we seize?
- What rules do we use for project investment decisions? To what extent do they capture the knowledge of the whole organization?
- Suppose we had a "rule of three". How would people respond? What problems would it create? How could we harness the creativity?
- Is there another rule that would suit our culture better yet incentivize dispersed innovation and social convergence?

In volatile markets, the key function of senior managers is to create a fertile environment for sensing, shaping and seizing market opportunities. The above questions form the basis for deeper and more probing conversations about strategy, innovation, and organizing for dynamic capabilities.

Notes

¹ We gathered information about Valve Corporation by interviewing Greg Coomer, one of the first employees of the company and the primary author of *Valve: Handbook for New Employees*. See *Valve: Handbook for New Employees*, First Edition – March, 2012.

For press coverage about the company, see “Game Maker Without a Rule Book,” *New York Times*, September 8, 2012 (page BU1). For an employee account of working at Valve, see “Valve: How I Got Here, What It’s Like, and What I’m Doing,” by Michael Abrash, <http://blogs.valvesoftware.com/abrash/valve-how-i-got-here-what-its-like-and-what-im-doing-2/>

For a recent presentation about the structure of Valve, see Greg Coomer, “Welcome to Flatland,” Seattle Interactive Conference, October 15-16, 2012. <https://www.youtube.com/watch?v=xzEju-XZfv4>

² We build our arguments largely on the sensing, shaping and seizing framework developed by Teece and colleagues, for example:

D.J. Teece, G. Pisano, A. Shuen. “Dynamic Capabilities and Strategic Management,” *Strategic Management Journal* 18 (1997): 509-533.

D.J. Teece. “Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance,” *Strategic Management Journal* 28 (2007): 1319–1350.

D.J. Teece. *Dynamic Capabilities and Strategic Management*, (Oxford: Oxford University Press, 2009).

D.J. Teece. “The Foundations of Enterprise Performance: Dynamic and Ordinary Capabilities in an (Economic) Theory of Firms, *Academy of Management Perspectives* (2014), forthcoming.

For a review of definitions of capabilities, see Barreto, I. “Dynamic capabilities: A Review of Past Research and an Agenda for the Future,” *Journal of Management* 36 (2010): 256-280.

³ G. McNamara, P.M. Vaaler, and C. Devers, “Same as it Ever Was: The Search for Evidence of Increasing Hypercompetition,” *Strategic Management Journal* 24 (2003): 261-278.

Also see: H. Mintzberg, “That’s not ‘Turbulence,’ Chicken Little, It’s Really Opportunity,” *Planning Review* (November-December 1994): 7-9.

⁴ We focus mainly on the capabilities of sensing, shaping and seizing. There are other streams of research on capabilities – for example, capabilities for product development. See:

G.Verona and Ravasi, D. “Unbundling Dynamic Capabilities: An Exploratory Study of Continuous Product Innovation,” *Industrial and Corporate Change* 12 (2003): 577-606.

C. Salvato.” Capabilities Unveiled: The Role of Ordinary Activities in the Evolution of Product Development Processes,” *Organization Science* 20 (2009): 384-409.

For an article on the link between dynamic capabilities, resource alteration and cognition, see E. Danneels. “Trying to Become a Different Type of Company: Dynamic Capability at Smith Corona,” *Strategic Management Journal* 32 (2011): 1-31.

⁵ A. Stinchcombe. *Information and Organization* (University of California Press, 1990): 32.

⁶ K. Arrow. *Limits of Organization*. New York, 1974.

⁷ S. Kerr, “On the Folly of Rewarding A While Hoping for B,” *Academy of Management Journal* 18 (1975): 769-783.

⁸ Throughout the paper we use the term “differentiation” in the sense employed by organization theorists such as Lawrence and Lorsch (1967), in reference to structural mechanisms (such as roles, functional areas, and specialized project teams) designed to align the organization’s structure with the degree of complexity and dynamism presented by its environment. These mechanisms make the organization internally complex (“differentiated”), requiring structural mechanisms (such as committees and formal planning) for coordinating complex internal activities (“integration”). For further discussion, see:

P. Lawrence and J. Lorsch, *Organization and Environment: Managing Differentiation and Integration* (Cambridge MA, Harvard University Press, 1967).

T. Burns and Stalker, G.M. *The Management of Innovation* (London, Tavistock, 1961).

J.G. March and H.A. Simon, *Organizations* (New York, Wiley, 1958).

R.E. Miles and C. Snow, *Organizational Strategy, Structure and Process* (Stanford CA, Stanford Press, 1978).

For applications of organization theory to strategies in high technology industries, see:

T.C Powell, “Firm-Specific Competitive Advantage in High-Technology Firms,” *Journal of High Technology Management Research* 4(2) (1993): 197-209.

D.J. Teece. Firm organization, industrial structure, and technological innovation. *Journal of Economic Behavior & Organization*, 31, 193-224 (1996).

Classic distinctions between hierarchy and bureaucracy and more decentralized forms of organization and governance go back to the work of Max Weber and other organizational sociologists. A rich tradition also exists in political science, contrasting decentralized and centralized forms. For example, see R. Dahl. *Polyarchy: Participation and Opposition*. New Haven: Yale University Press.

⁹ See D.J. Teece. “Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance,” *Strategic Management Journal* 28 (2007): 1319–1350.

¹⁰ See R. Dahl. *A Preface to Democratic Theory*. (Chicago: University of Chicago Press, 1956).

¹¹ R.K. Sah and J.E. Stiglitz. “The architecture of economic systems: Hierarchies and polyarchies,” *American Economic Review* 76 (1986): 716-727.

T. Knudsen and D. Levinthal. "Two faces of search: Alternative generation and alternative evaluation," *Organization Science* 18: 39-54.

F. Csaszar and J.P. Eggers. "Organizational Decision Making: An Information Aggregation Perspective," *Management Science* 59(2013): 2257-2277.

¹² R.K. Sah and J.E. Stiglitz. "The architecture of economic systems: Hierarchies and polyarchies," *American Economic Review* 76 (1986): 716-727.

T. Knudsen and D. Levinthal. "Two faces of search: Alternative generation and alternative evaluation," *Organization Science* 18: 39-54.

F. Csaszar and J.P. Eggers. "Organizational Decision Making: An Information Aggregation Perspective," *Management Science* 59(2013): 2257-2277.

¹³ Sah and Stiglitz (1986) noted that polyarchies reduce Type I errors, in which valuable projects are rejected; hierarchies reduce Type II errors, in which poor projects are initiated.

¹⁴ See T. Felin, Zenger, T., Tomsik, J. "The knowledge economy: Emerging organizational forms, missing microfoundations, and key considerations for managing human capital," *Human Resource Management* 48 (2009): 555-570.

D.J. Teece. "Expert talent and the design of (professional services) firms," *Industrial and Corporate Change* 12 (2003): 895-916; Csaszar, F.A., "Organizational structure as a determinant of performance: Evidence from mutual funds." *Strategic Management Journal* 33/2 (2012): 611-632.

M. Reitzig, Maciejovsky, B., "Corporate hierarchy and vertical information flow inside the firm: A behavioral view." *Strategic Management Journal* (2015), forthcoming.

¹⁵ We thank an anonymous reviewer for making this point.

¹⁶ R. Smith. "Valve to showcase SteamVR hardware, steam machines and more at the GDC 2015," *Anandtech Hardware Magazine*, February 23, 2015.

K. Boudreau, Lakhani, K.R. 2013. Using the crowd as an innovation partner. *Harvard Business Review*, 61-69.

¹⁷ R.B. Cialdini. *Influence: How and Why People Agree on Things*. New York, 1984.

¹⁸ C. Stangor. *Social Groups in Action and Interaction*. (Psychology Press, 2004).

G. LeBon. *The Crowd: A Study of the Popular Mind*. (New York, MacMillan, 1896).

S. Freud. *Group Psychology and the Analysis of the Ego*. (London, International Psychoanalytic Press, 1922).

¹⁹ T. Felin, Zenger, T. "Information aggregation, matching and radical market-hierarchy hybrids: Implications for the theory of the firm," *Strategic Organization* 9 (2011): 163-173.

K. Croxson. "Information markets for decision making: Performance and feasibility," Oxford University Working Paper.

²⁰ "Pure form" polyarchies allow individuals to sense and seize their own opportunities. For further discussion, see T. Knudsen and D. Levinthal. "Two faces of search: Alternative generation and alternative evaluation," *Organization Science* 18: 39-54.

²¹ T. Felin. "Cosmologies of capability, markets and wisdom of crowds," *Managerial and Decision Economics*, 33 (2012): 283-294; also Surowiecki, J. *Wisdom of Crowds* (Doubleday, 2004).

For an excellent, recent managerial piece, see: H. Courtney, D. Lovallo, C. Clarke. Deciding how to decide. *Harvard Business Review* 91(11): 62-70 (2013).

²² D.J. Teece. Firm organization, industrial structure, and technological innovation. *Journal of Economic Behavior & Organization*, 31, 193-224 (1996).

²³ N. Foss. "Selective intervention and internal hybrids: Interpreting and learning from the rise and decline of the oticon spaghetti organization," *Organization Science* 14 (2003): 331-349.

T. Zenger, Hesterly, W.S. "The disaggregation of corporations: Selective intervention, high-powered incentives, and molecular units," *Organization Science* 8 (1997): 209-222.

²⁴ R.R., Faulkner, Anderson, A.B. Short-term projects and emergent careers: Evidence from Hollywood. *American Journal of Sociology*, 92, 879-909 (1987).

Also see:

J. Lampel, Shamsie, J. Capabilities in motion: New organizational forms and the reshaping of the Hollywood movie industry. *Journal of Management Studies*, 40, 2189-2210 (2003).

S. Deakin, Lourenco, A., Pratten, S. No "third way" for economic organization? Networks and quasi-markets in broadcasting. *Industrial and Corporate Change*, 18(1), 51-75 (2009).

²⁵ D. Adam. What Hollywood can teach us about the future of work. *New York Times*, May 5 (2015).

²⁶ E.Schmidt, Rosenberg, J. *How Google Works* (Grand Central Publishing, 2014).

²⁷ For example, see J.B. Harreld, O'Reilly, C.A., Tushman, M.L. Dynamic capabilities at IBM: Driving strategy into action. *California Management Review*, 49(4), 21-43 (2007).

²⁸ N. Foss. "Selective intervention and internal hybrids: Interpreting and learning from the rise and decline of the oticon spaghetti organization," *Organization Science* 14 (2003): 331-349.

T. Zenger, Hesterly, W.S. "The disaggregation of corporations: Selective intervention, high-powered incentives, and molecular units," *Organization Science* 8 (1997): 209-222.

²⁹ D. Sumpter. *Collective Animal Behavior* (Princeton University Press, 2010).

³⁰ M. Diehl, Stroebe W. “Productivity loss in brainstorming groups: Toward the solution of a riddle,” *Journal of Personality and Social Psychology* 53 (1987): 497-509;

S.E.Asch. *Group Forces in the Modification and Distortion of Judgments* (Prentice Hall, 1952). For a more recent summary, see C. Stangor. *Social Groups in Action and Interaction* (Psychology Press, 2004).

³¹ When interviewing Valve, we asked if they were worried about introducing social biases into their decision making. They recognized that social biases were possible. However, they argued that the individuals they hire – talented and capable (and perhaps low self-monitors) – might be less susceptible to unwarranted social influences, which is debatable but has some support in psychological research (e.g., see Stanovich KE. 2011. *Rationality and the Reflective Mind*. Oxford University Press). For additional work on the relationship between individual and group biases, see:

W.G., Luhan, M.G. Kocher, and M. Sutter. "Group Polarization in the Team Dictator Game Reconsidered." *Experimental Economics* 12 (2009): 26-41. Also see:

M.G. Kocher and M. Sutter. “The Decision Maker Matters: Individual Versus Group Behavior in Experimental Beauty Contest Games.” *The Economic Journal* (2005), 115: 200-223. Thanks to an anonymous reviewer for pointing out this literature.

³² T.C. Powell, D. Lovallo, and C.R. Fox. “Behavioral Strategy,” *Strategic Management Journal*, 32/13 (2011): 1369-1386.

D. Lovallo and O. Sibony, “The Case for Behavioral Strategy,” *McKinsey Quarterly* March 2010: 1-16.

³³ T.C. Powell, “Neurostrategy,” *Strategic Management Journal*, 32/13 (2011): 1484-1499.

³⁴ R. H. Thaler, Sunstein C.R. *Nudge: Improving Decisions About Health, Wealth, and Happiness* (New Haven CT, Yale University Press, 2008)

C. Heath, Larrick R.P., Klayman J. Cognitive repairs: How organizations compensate for the shortcomings of individual learners, *Research in Organizational Behavior* 20 (1998): 1-37.

H. Courtney, D. Lovallo, C. Clarke. Deciding how to decide. *Harvard Business Review* 91(11): 62-70 (2013).

³⁵ D. Kahneman, D. Lovallo. Timid choices and bold forecasts: A cognitive perspective on risk-taking, *Management Science*, 39(1) (1993): 17-31.

D.A. Levinthal, J.G. March. The myopia of learning, *Strategic Management Journal*, 14 (1993): 95-112.

³⁶ B. Levitt and March J.G. Organizational Learning, *Annual Review of Sociology* 14 (1988): 319-340.

³⁷ T.C. Powell. “Strategic Management and the Person,” *Strategic Organization* 12 (2014): 200-207.

³⁸ D.V. Budescu, E. Chen. “Identifying expertise to extract the wisdom of crowds,” *Management Science*, forthcoming (2014).

³⁹ T. Felin and T.R. Zenger. “Open or closed innovation: Problem solving and the governance choice,” *Research Policy* 43 (2014): 914-925.

H.W. Chesbrough, 2003. *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business Press.

⁴⁰ K. Boudreau and K.R. Lakhani. “Using the crowd as an innovation partner,” *Harvard Business Review* (2013): 61-69.

⁴¹ L.B. Jeppesen, L. Frederiksen. “Why do users contribute to firm-hosted user communities: The case of computer-controlled music instruments,” *Organization Science* 17 (2006): 45-63.

N. Franke, S. Shah. “How communities support innovative activities: An exploration of assistance and sharing among end users,” *Research Policy* 32 (2003): 157-178.

⁴² L. Dahlander, Piezunka, H. “Open to suggestions: How organizations elicit suggestions through proactive and reactive attention,” *Research Policy* 2013.

⁴³ K. J. Boudreau, N. Lacetera, K.R. Lakhani. “Incentives and problem uncertainty in innovation contests: An empirical analysis,” *Management Science* 57: 843-867.

⁴⁴ L.B. Jeppesen and K.R. Lakhani. “Marginality and problem-solving effectiveness in broadcast search,” *Organization Science* 21 (2010): 1016-1033.

⁴⁵ P. Belleflamme, Lambert, T., Schwienbacher, A. Crowdfunding: Tapping the right crowd. *Journal of Business Venturing*, forthcoming.

⁴⁶ For example, see:

O.E. Williamson. Strategy Research: Governance and Competence Perspectives. *Strategic Management Journal* 20: 1087–108 (1999).

T.C. Powell. Competitive Advantage: Logical and Philosophical Considerations, *Strategic Management Journal* 22(9), 875-888. (2001).

S.G. Winter. Understanding dynamic capabilities. *Strategic Management Journal*, 24(10), 991–995 (2003)

M. Peteraf, G. Di Stefano, G. Verona. The elephant in the room of dynamic capabilities: Bringing two diverging conversations together. *Strategic Management Journal* 34(12): 1389–1410 (2014).

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